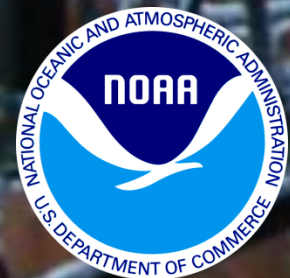


The January 2012 Ice Storm Through the Eyes of a Dual Pol Radar



Carl Cerniglia
Incident Meteorologist
NWS Seattle

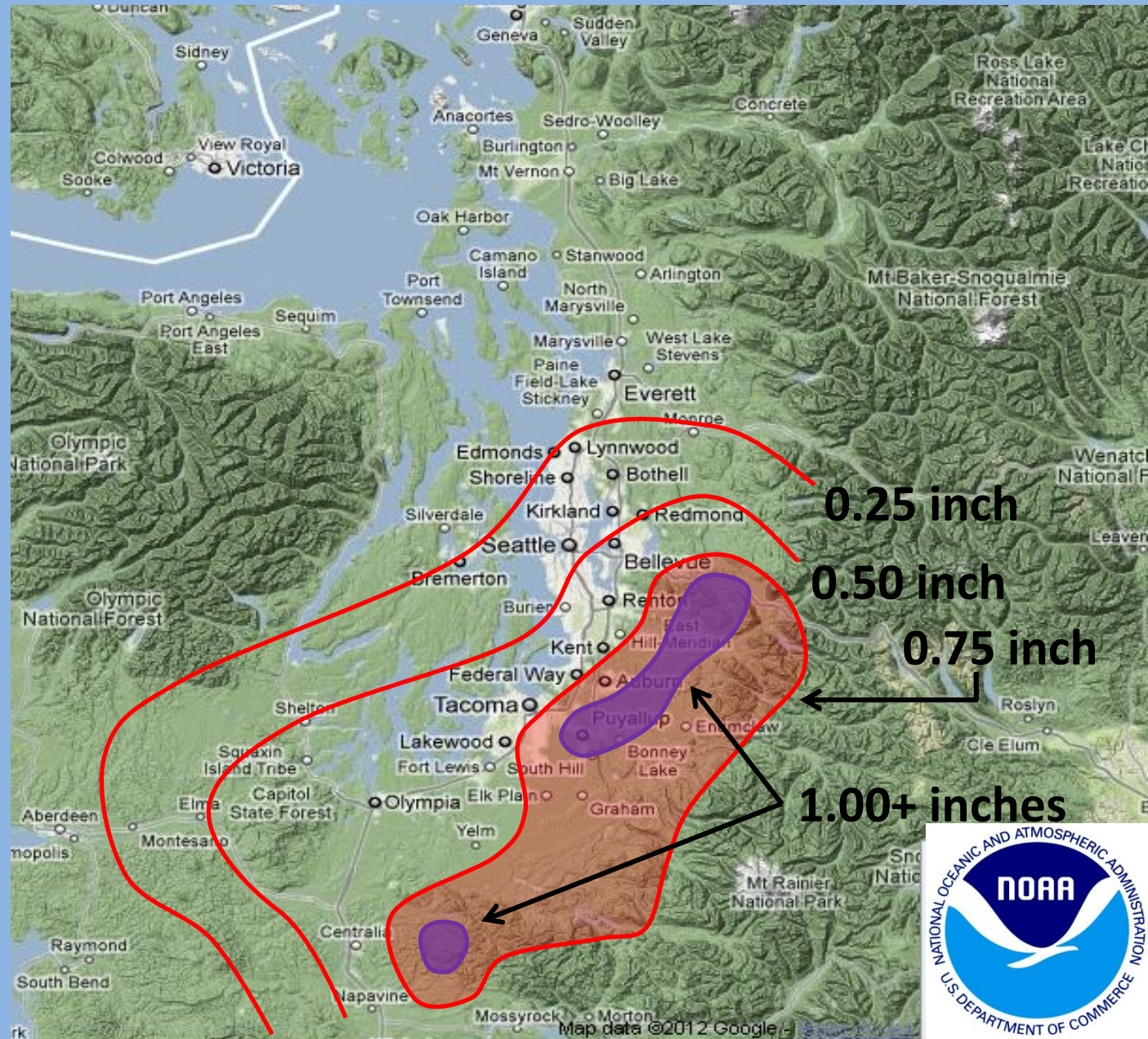


What We Will Cover

- Overview of the event weather wise
 - General synopsis and timeline
 - Vertical thermal structure
 - Important to why the radar displayed what it did
- Primer on the Dual Pol Products used in this case
- An overview of the radar data
 - A view using Reflectivity data
 - Basically all we had before
 - The Dual Pol products point of view

Approximate Freezing Rain/Drizzle Accumulation from the Evening of January 18th through the afternoon of January 19th

- A warm front remained south of the region through the day.
- Near the surface, northerly flow across the area maintained below freezing temperatures over western Washington.
- Abundant moisture streamed north over this cold layer, producing a historic freezing rain event.
- An Ice Storm Warning was issued early on Thursday, January 19:
 - First issuance ever for Western WA
 - Activation of EAS.



WRF Domain 3

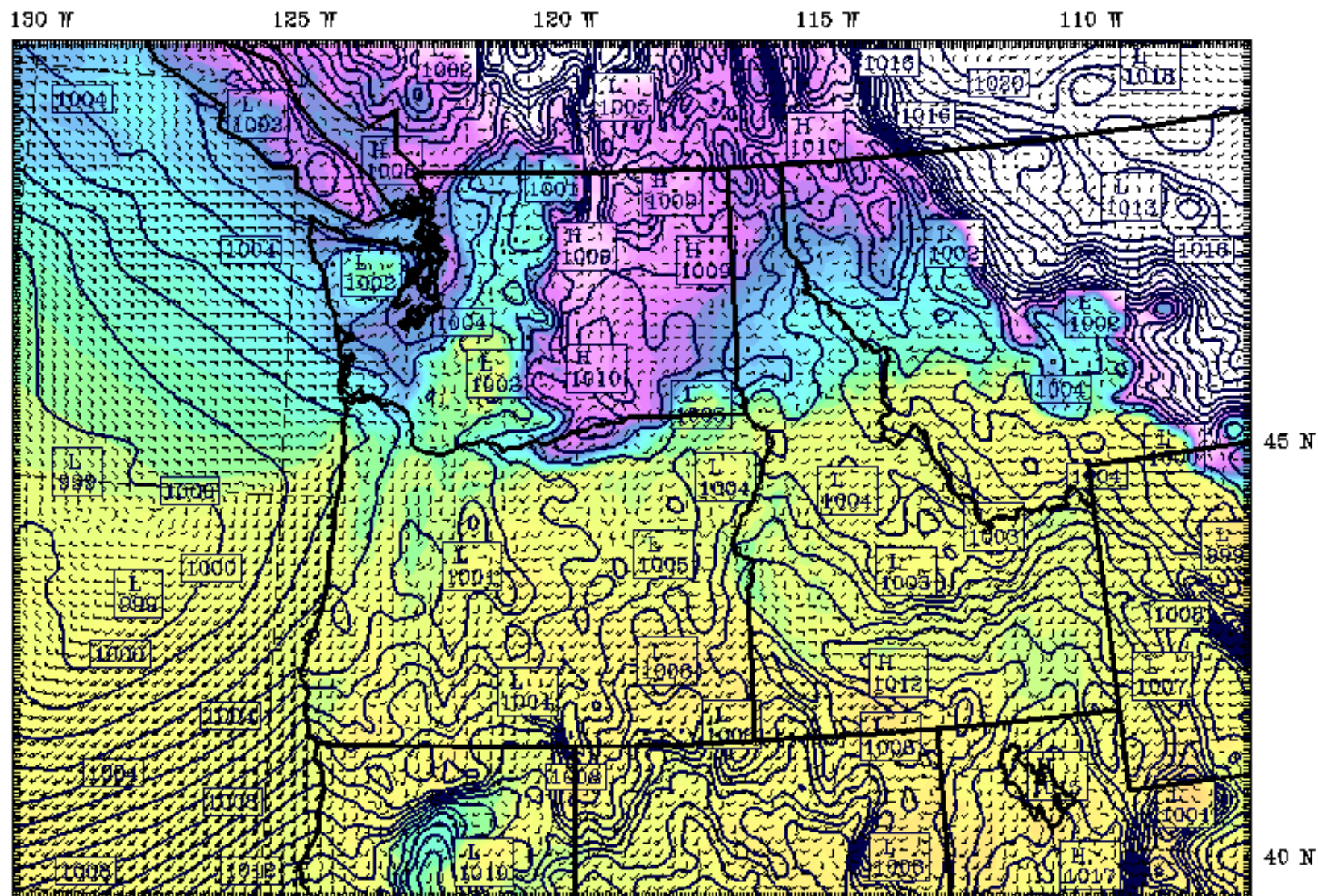
Fcst: 13 h

Temperature

Sea Level Pressure (hPa)

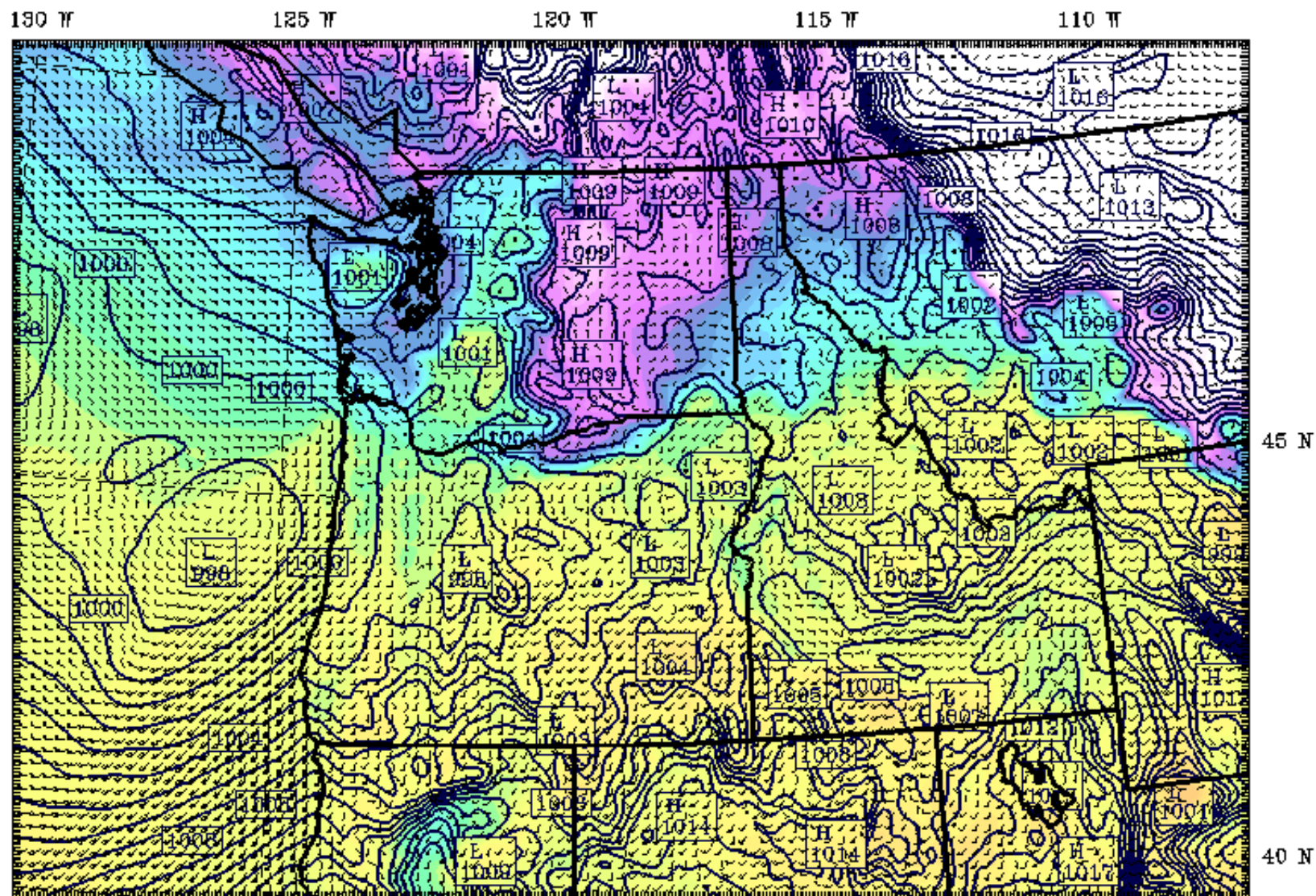
Wind at 10m (full barb = 10kts)

Init: 00 UTC Thu 19 Jan 12
Valid: 13 UTC Thu 19 Jan 12 (05 PST Thu 19 Jan 12)
at pressure = 1000 hPa sm= 6



Wind at 10m (full barb = 10kts)

Init: 00 UTC Thu 19 Jan 12
Valid: 15 UTC Thu 19 Jan 12 (07 PST Thu 19 Jan 12)
at pressure = 1000 hPa sm= 6



WRF Domain 3

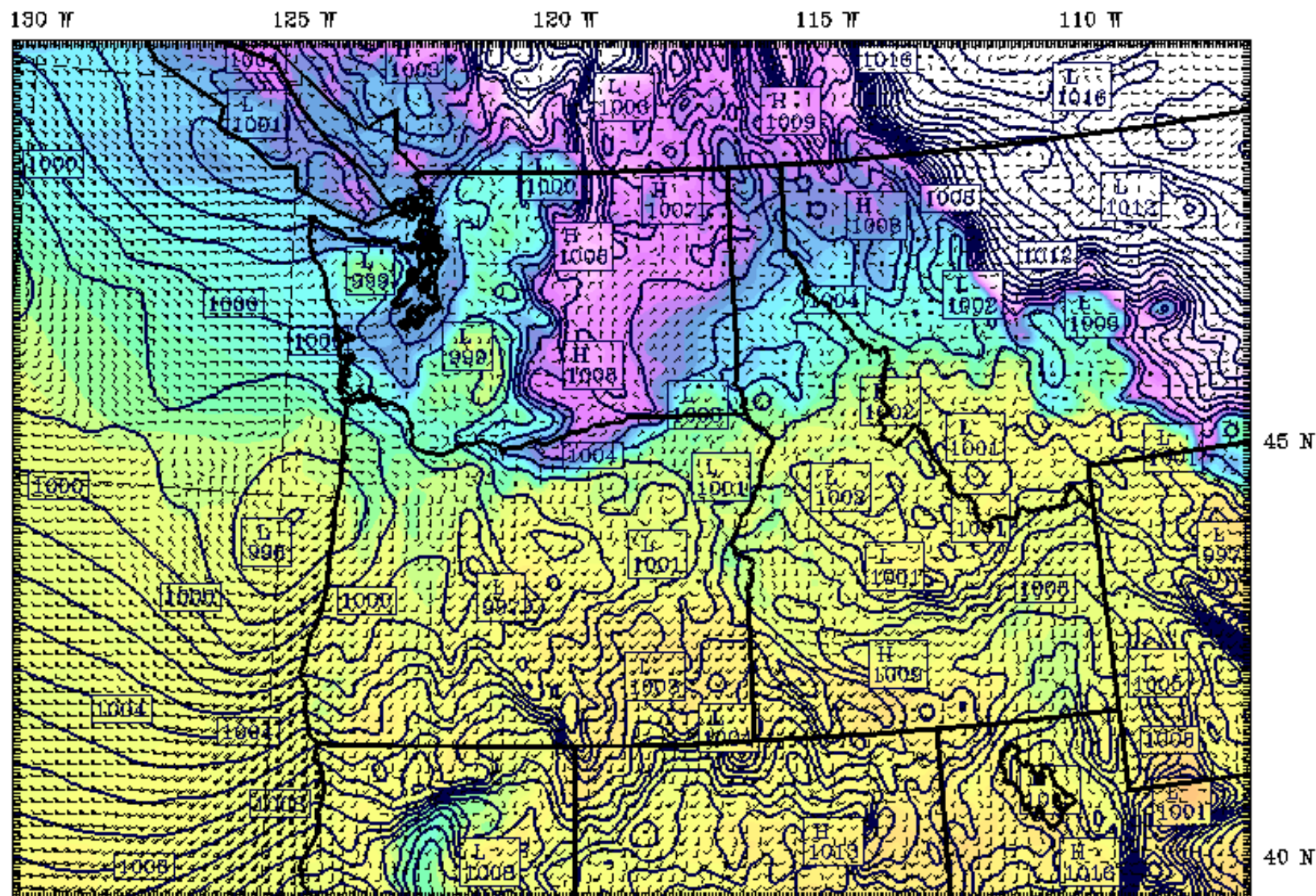
Fcst: 17 h

Temperature

Sea Level Pressure (hPa)

Wind at 10m (full barb = 10kts)

Init: 00 UTC Thu 19 Jan 12
Valid: 17 UTC Thu 19 Jan 12 (09 PST Thu 19 Jan 12)
at pressure = 1000 hPa sm= 6



WRF Domain 3

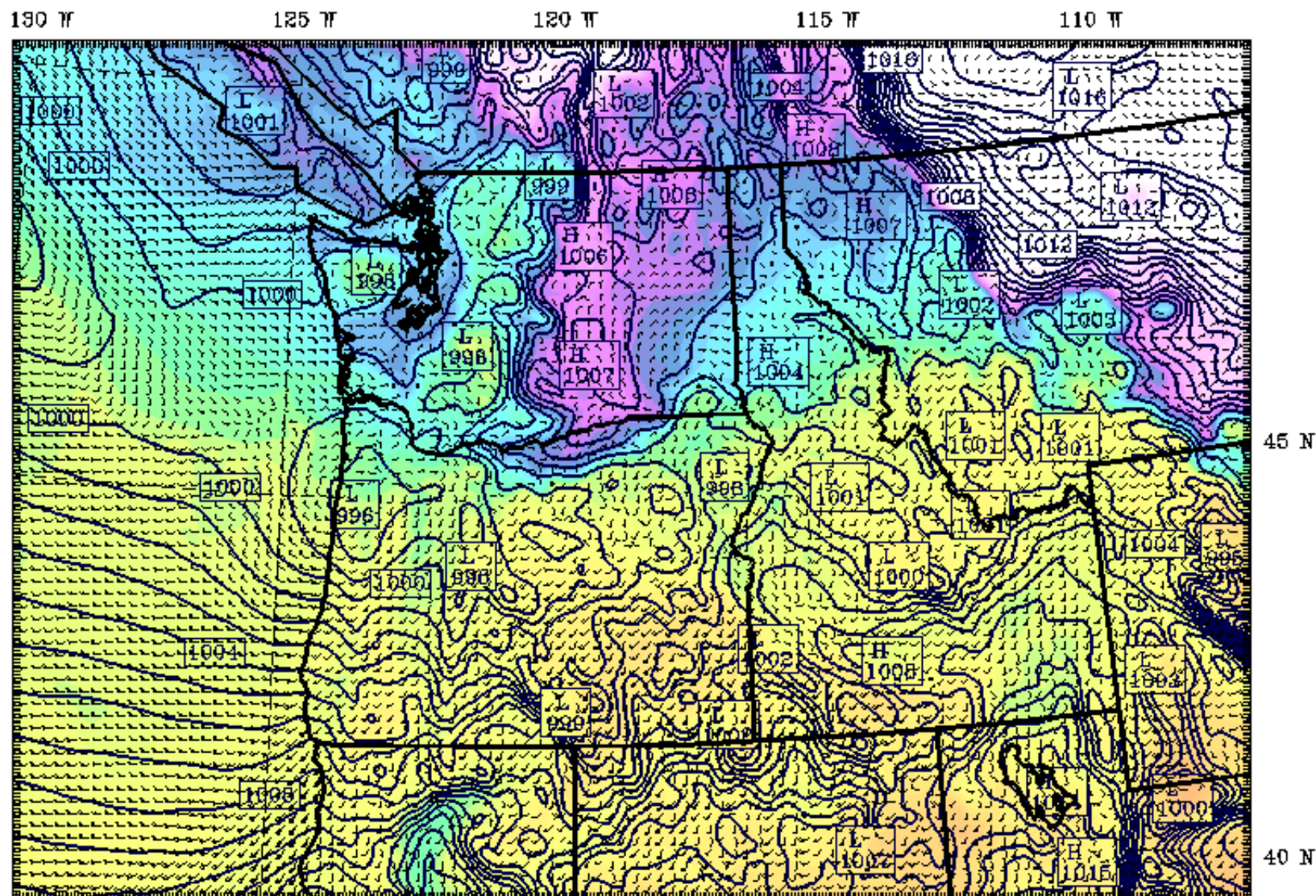
Fcst: 19 h

Temperature

Sea Level Pressure (hPa)

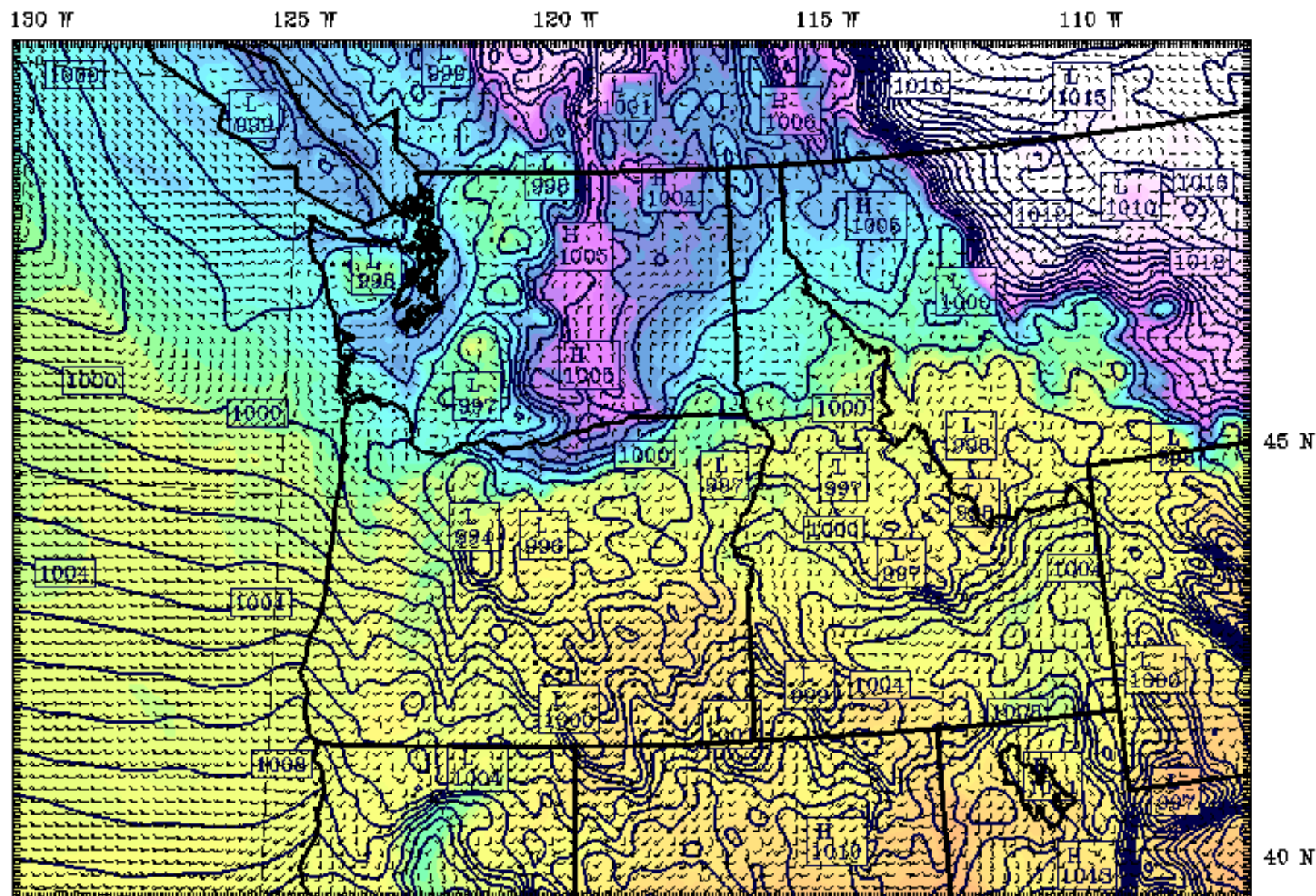
Wind at 10m (full barb = 10kts)

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Valid: 19 UTC Thu 19 Jan 12 (11 PST Thu 19 Jan 12)
at pressure = 1000 hPa sm= 6

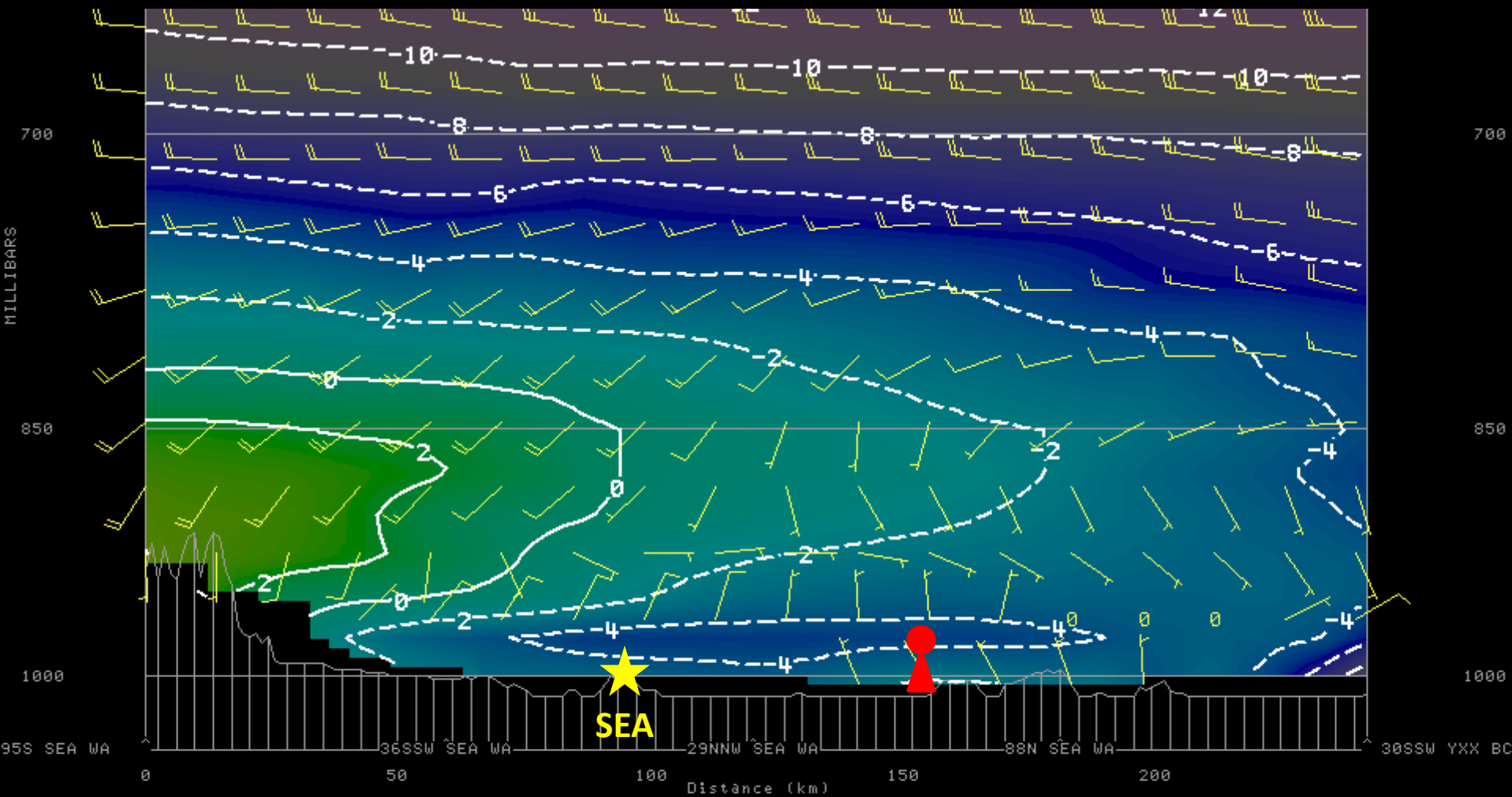


Wind at 10m (full barb = 10kts)

Init: 00 UTC Thu 19 Jan 12
Valid: 21 UTC Thu 19 Jan 12 (13 PST Thu 19 Jan 12)
at pressure = 1000 hPa sm= 6

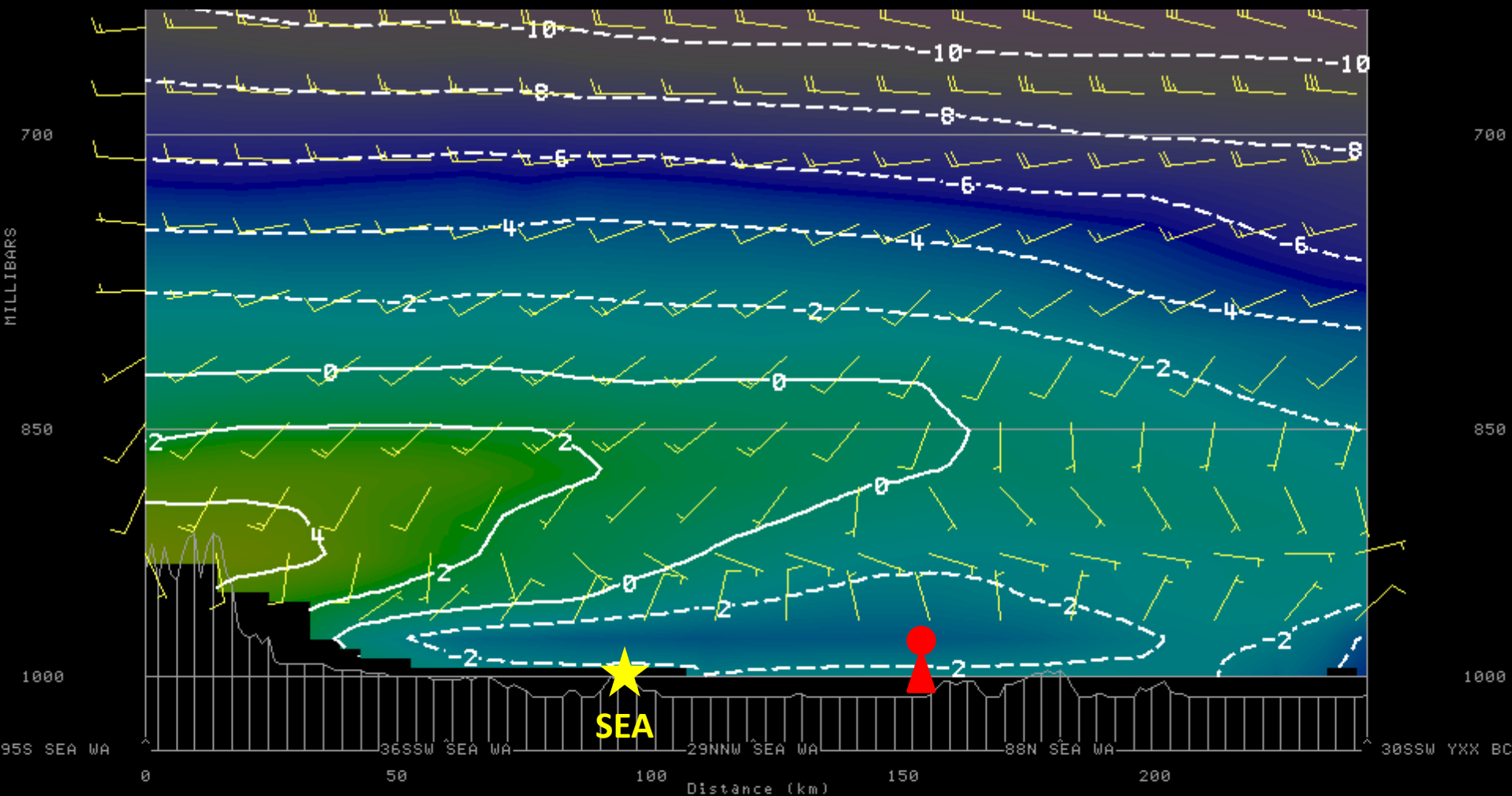


Cross-section @ 7 AM

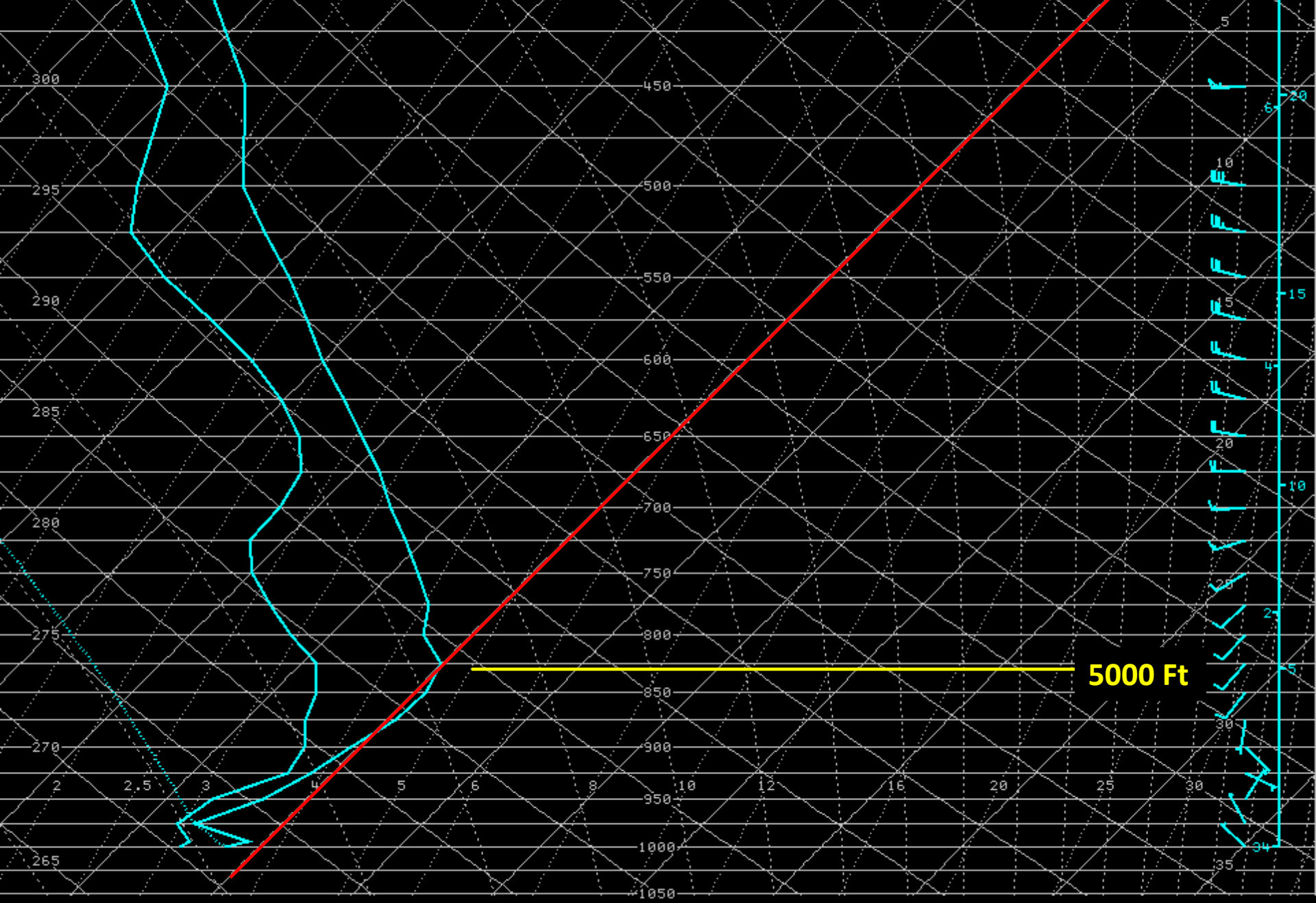


NAM12 lined	Wind (kts)	19.06	9HR	Thu	15:00Z	19-Jan-12
NAM12 lined	Temperature (C)	19.06	9HR	Thu	15:00Z	19-Jan-12
NAM12 lined	Temperature Img(C)	19.06	9HR	Thu	15:00Z	19-Jan-12

Cross-section @ 10 AM



NAM12 lined	Wind (kts)	19.06	12HR	Thu	18:00Z	19-Jan-12
NAM12 lined	Temperature (C)	19.06	12HR	Thu	18:00Z	19-Jan-12
NAM12 lined	Temperature Img(C)	19.06	12HR	Thu	18:00Z	19-Jan-12



NAM12	ptC	47.9N	122.3W	Sounding	()	19.06	12HR	Thu	18:00Z	19-Jan-12
NAM12	ptB	47.7N	122.3W	Sounding	()	19.06	12HR	Thu	18:00Z	19-Jan-12
NAM12	ptA	47.0N	122.9W	Sounding	()	19.06	12HR	Thu	18:00Z	19-Jan-12

Dual Pol Products

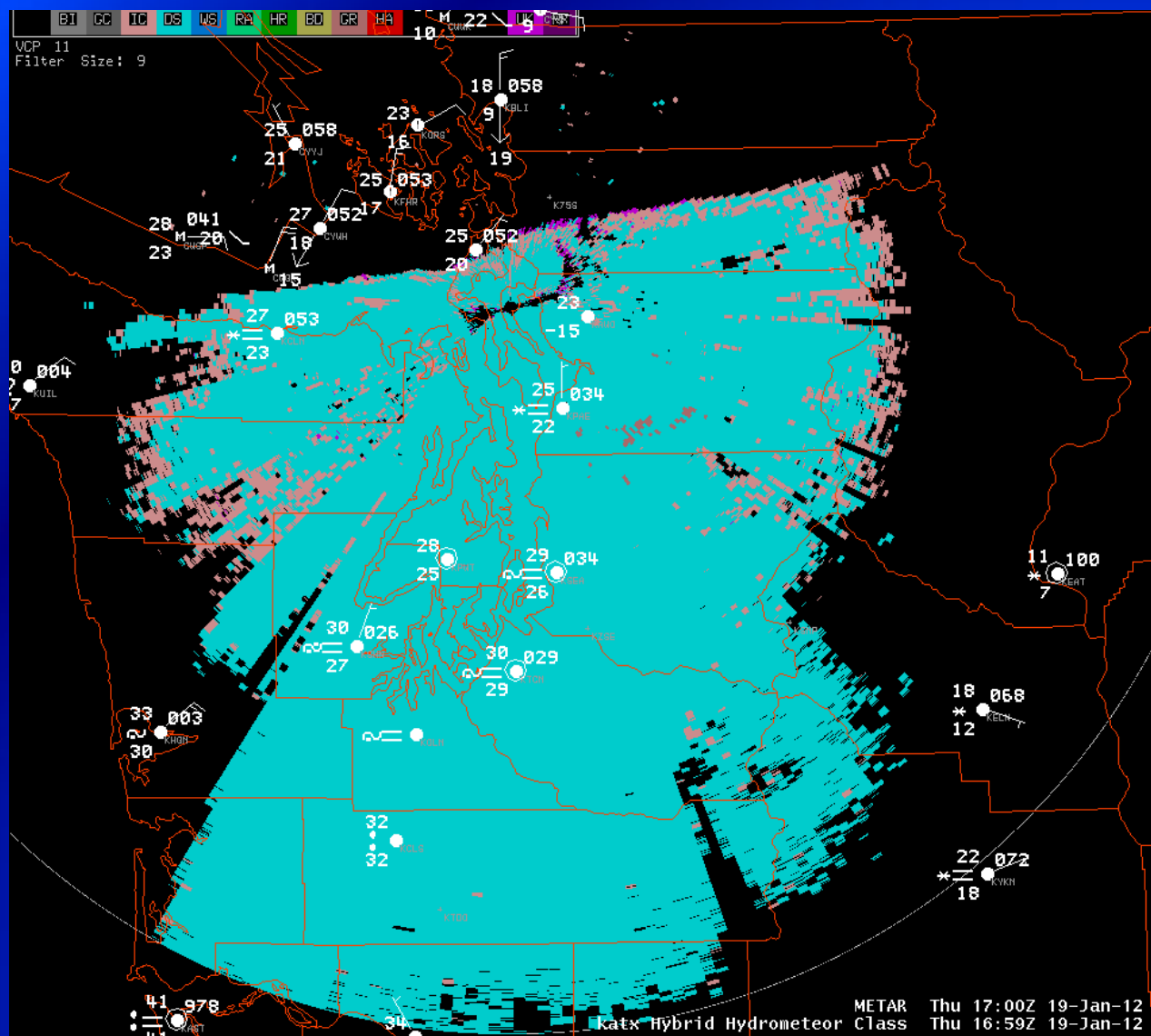
- Hydrometeor Classification (HC)
- Correlation Coefficient (CC)
- Differential Reflectivity (ZDR)
- Specific Differential Phase (KDP)

Dual Pol Products

- Hydrometeor Classification (HC)
- Correlation Coefficient (CC)
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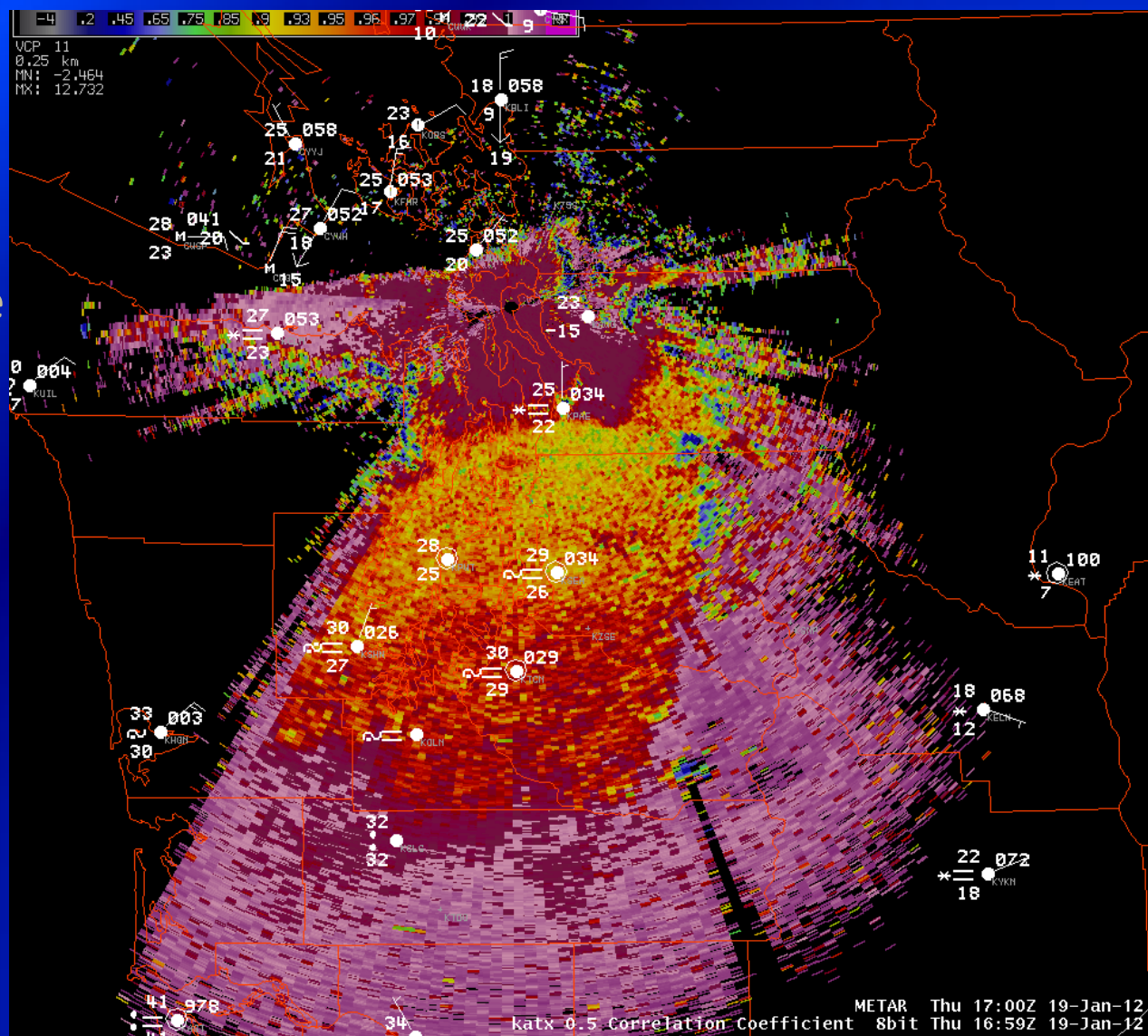
Hydrometeor Classification (HC)

- Output from an algorithm that attempts to determine precipitation type at Beam Level
- Sub-beam affects unaccounted for
- Very crude thermal profile input – hourly input from RUC13
- Was originally developed for use in warm-season convective weather



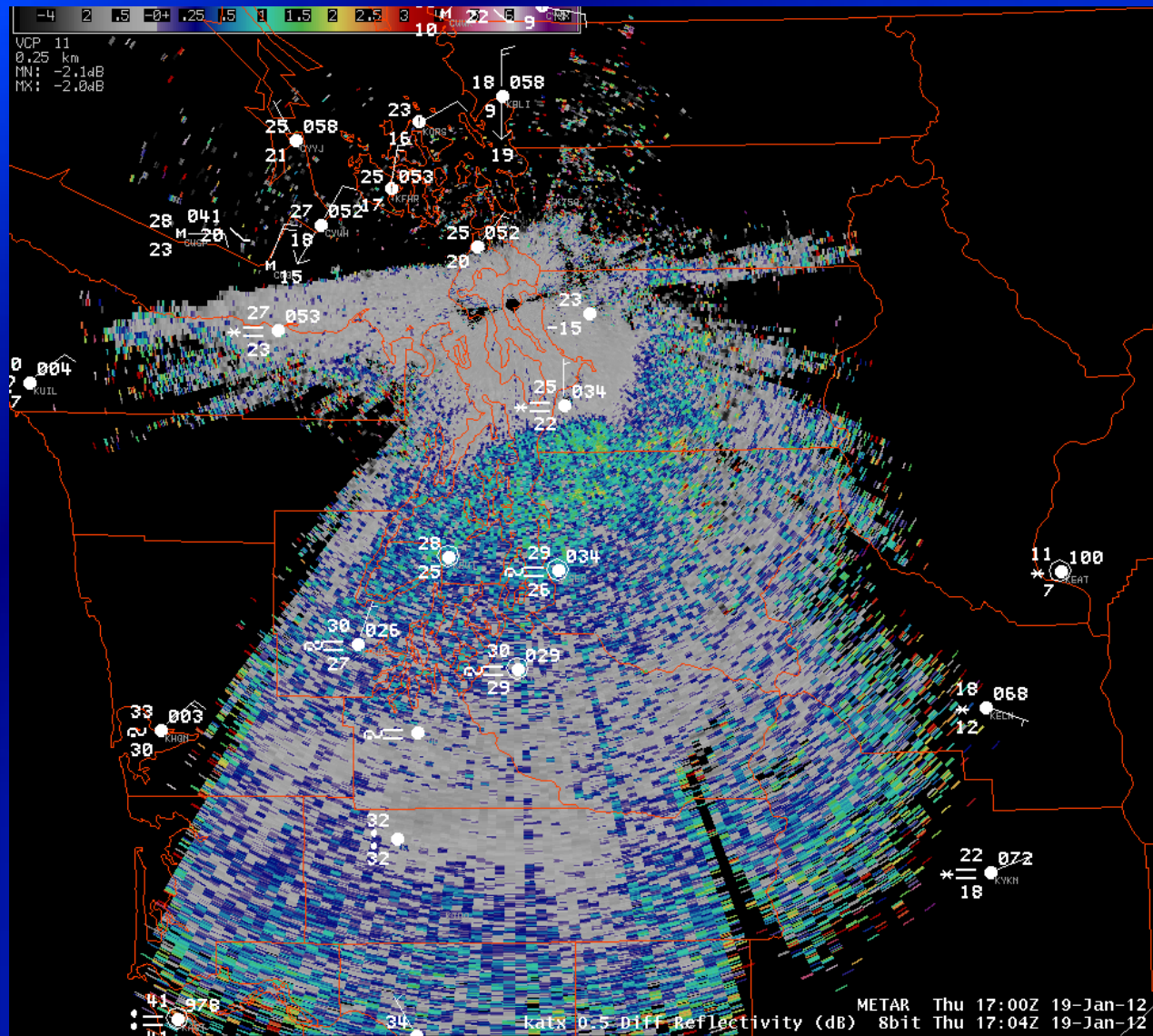
Correlation Coefficient (CC)

- A measure of how similarly the horizontal and vertical pulses are behaving within a pulse volume
- Again - at Beam Level
- Precipitation Type changes this
 - Uniform = Higher values
 - Non-Uniform = Lower
- Good for highlighting different precip types and the melting layer

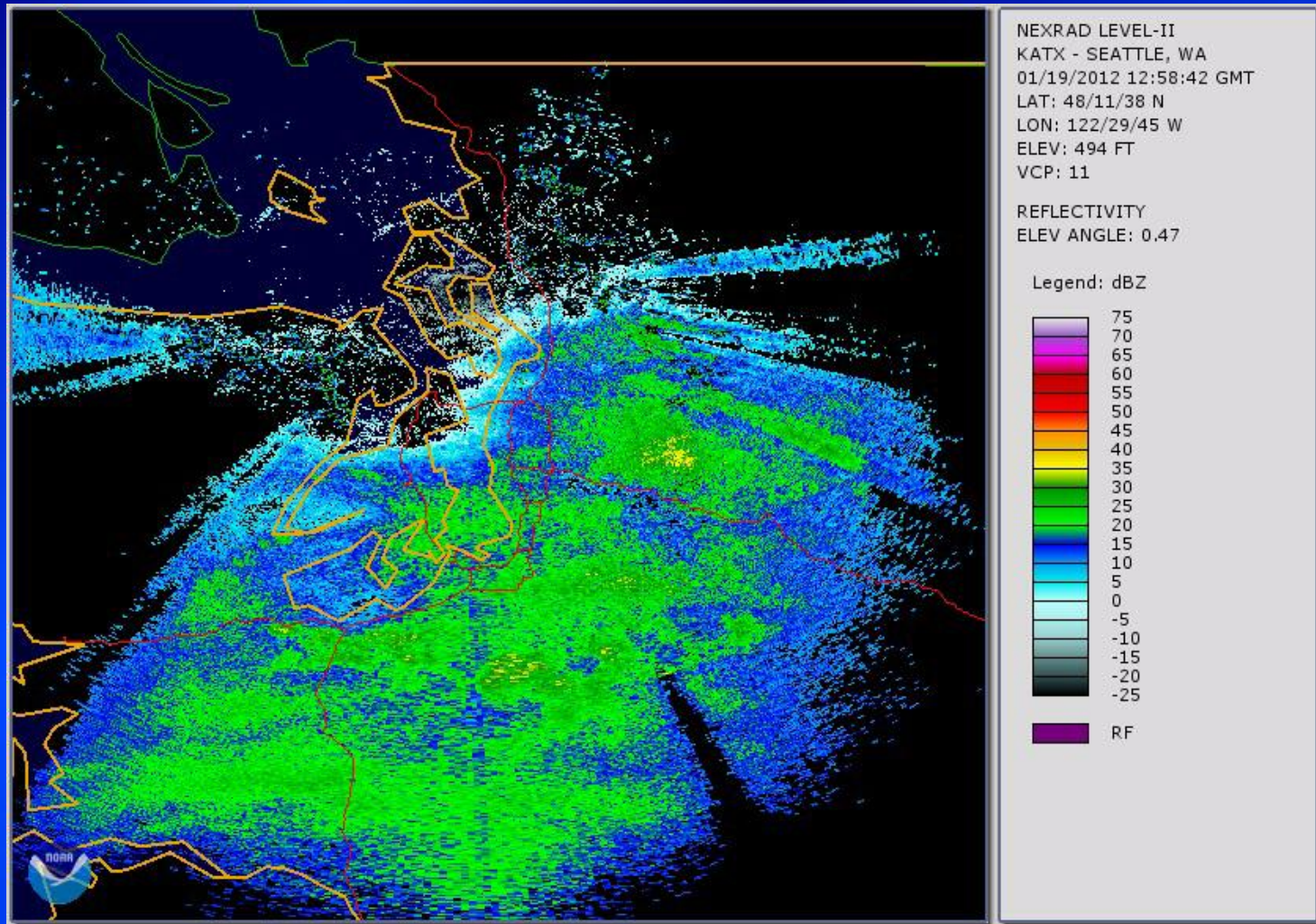


Differential Reflectivity (ZDR)

- A ratio of the difference of the returned power from the horizontal and vertical pulses
- Again - at Beam Level
- Precipitation Shape changes this
- Highlights rain vs snow



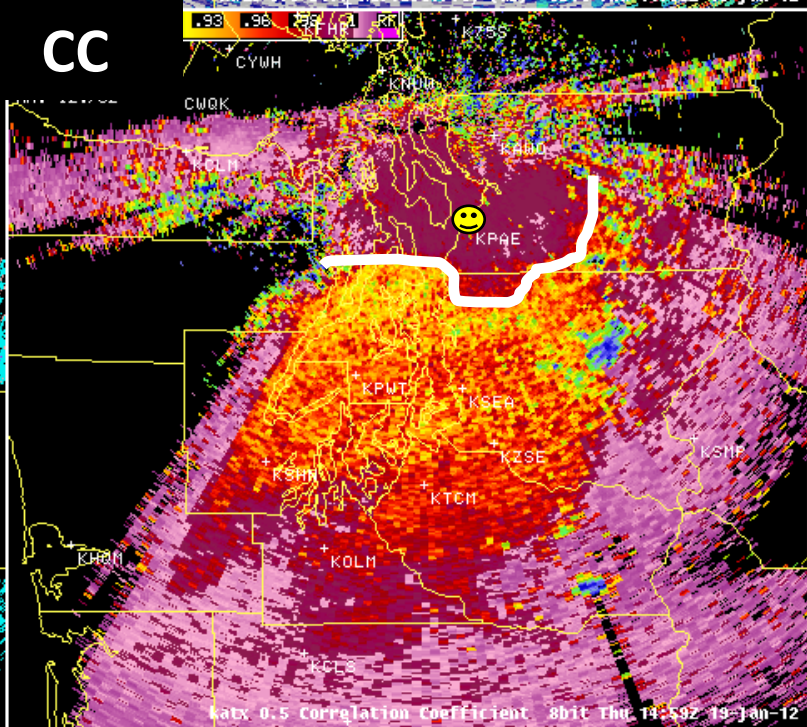
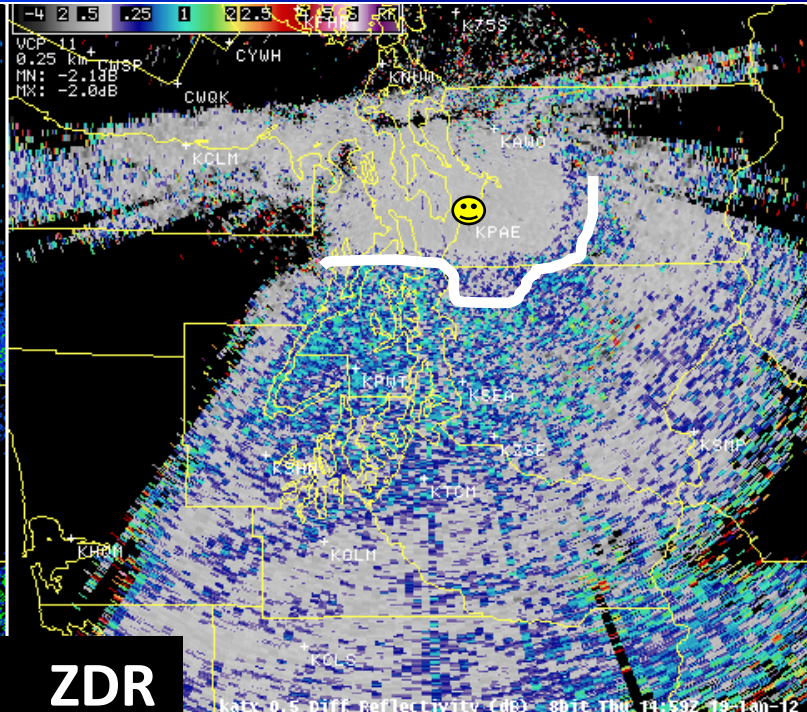
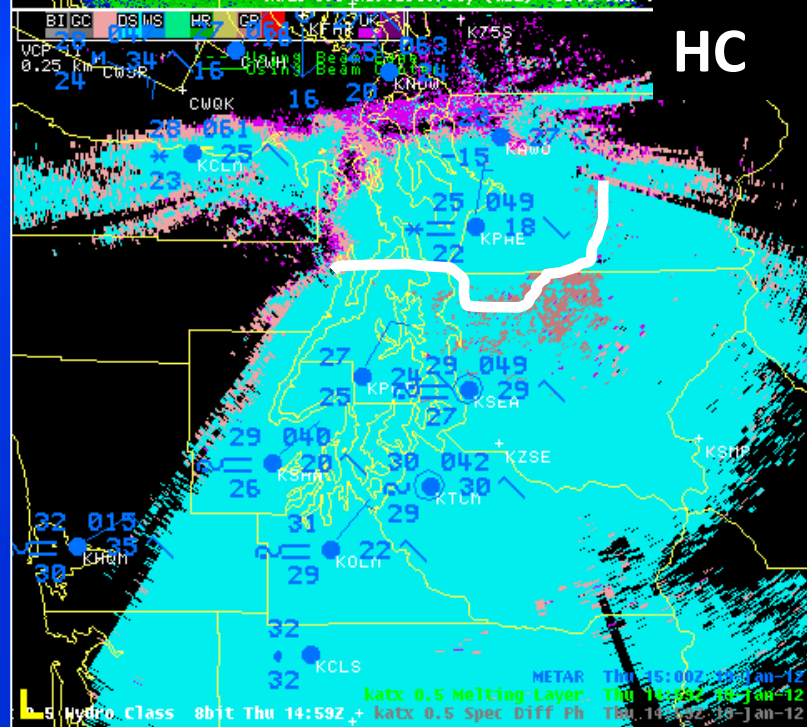
The Good Old Days



[illegible]

A weather radar reflectivity map showing a large area of high reflectivity (yellow/orange) centered over KPAE, indicating heavy rain or hail. The map includes station identifiers like KPAE, KMD, KCLM, KSMF, etc., and a color scale at the top.

ZDR
CC



0.33 0.36 0.39 0.42 0.45 0.48 0.51 0.54 0.57 0.60 0.63 0.66 0.69 0.72 0.75 0.78 0.81 0.84 0.87 0.90 0.93 0.96 0.99

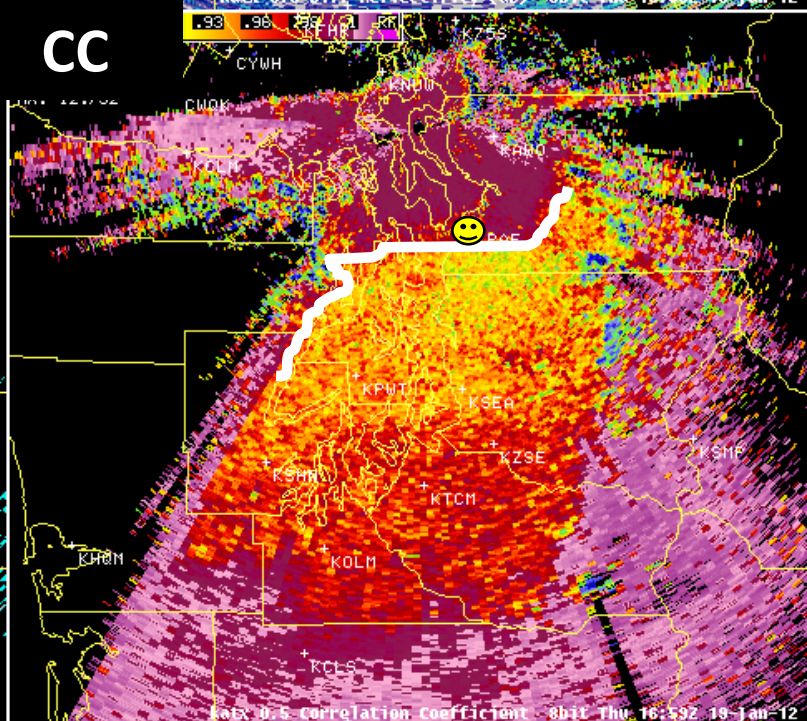
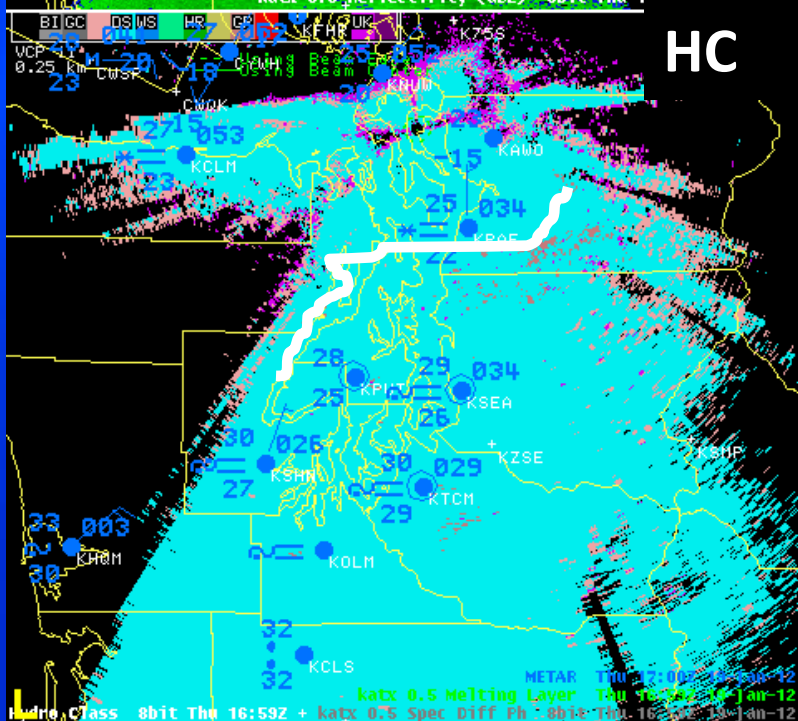
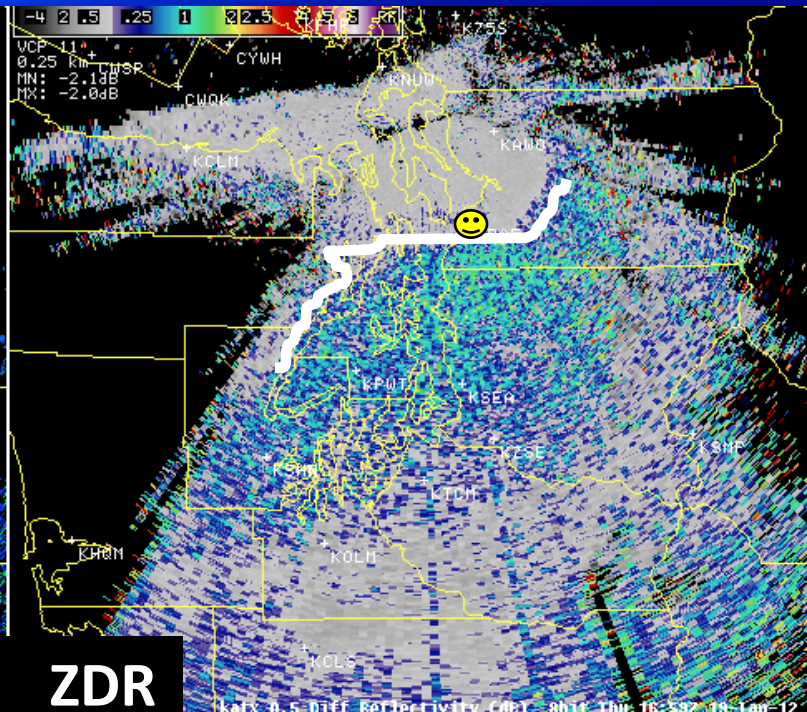
CYMH KPAE KPMO KSEA KZSE KSHR KTCM KOLM KCLS

KPAE

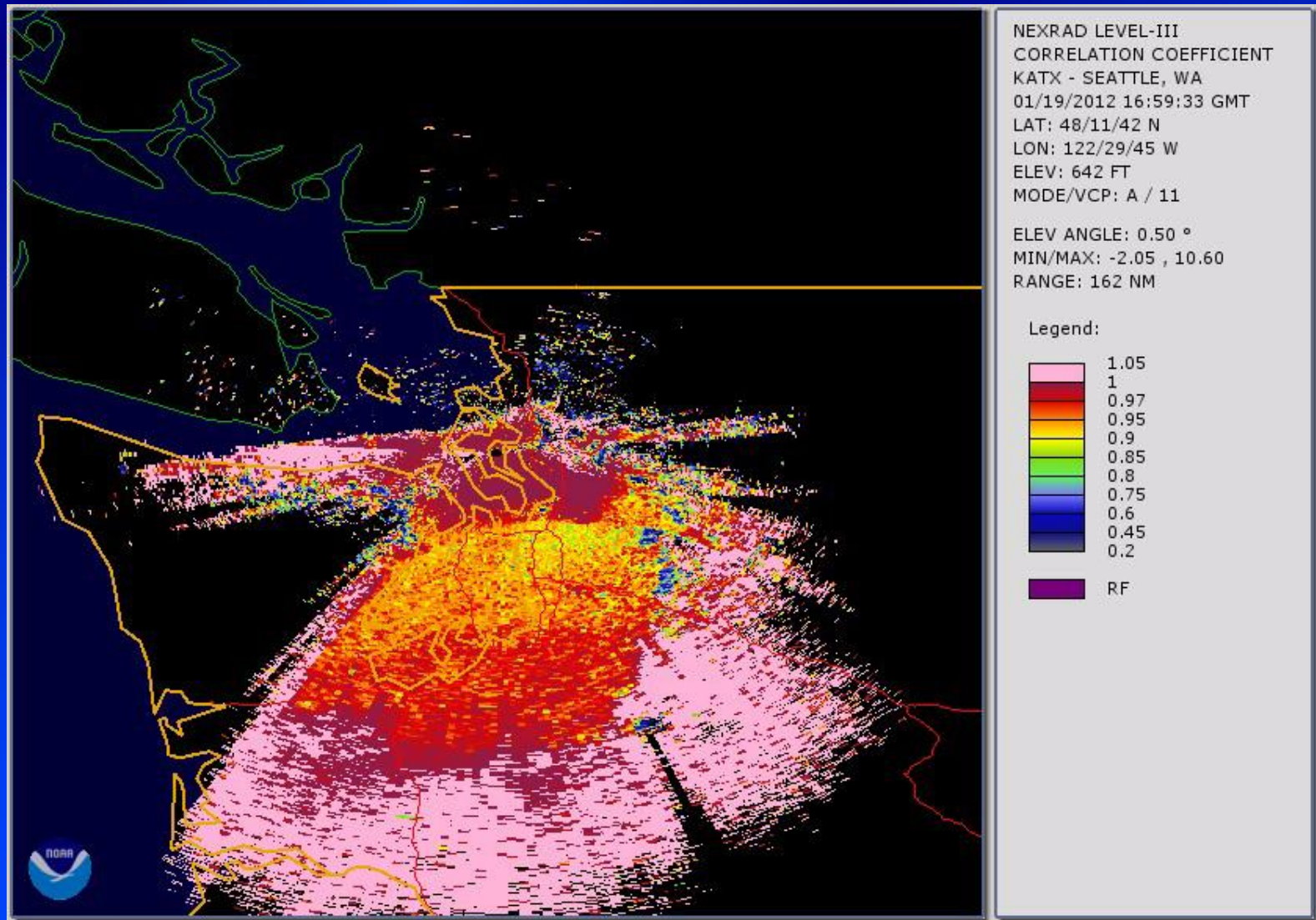
Late 0.5 Correlation Coefficient 8bit Thu 15:53Z 15-Jan-12

[illegible]

ZDR
CC



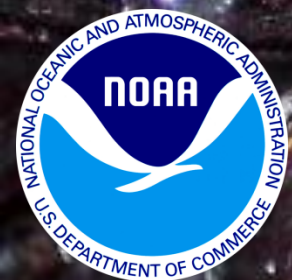
CC - 17Z-22Z (9am-2pm)



Summery

- The Dual Pol Products are an excellent “Nowcast” tool
- Current state of the HC product of limited use for some/many winter weather situations
- CC and ZDR products very useful in teasing out details on precipitation type, especially when overlaid on observations.
- KDP showed no utility for this case/situation

Questions?



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NWS Seattle





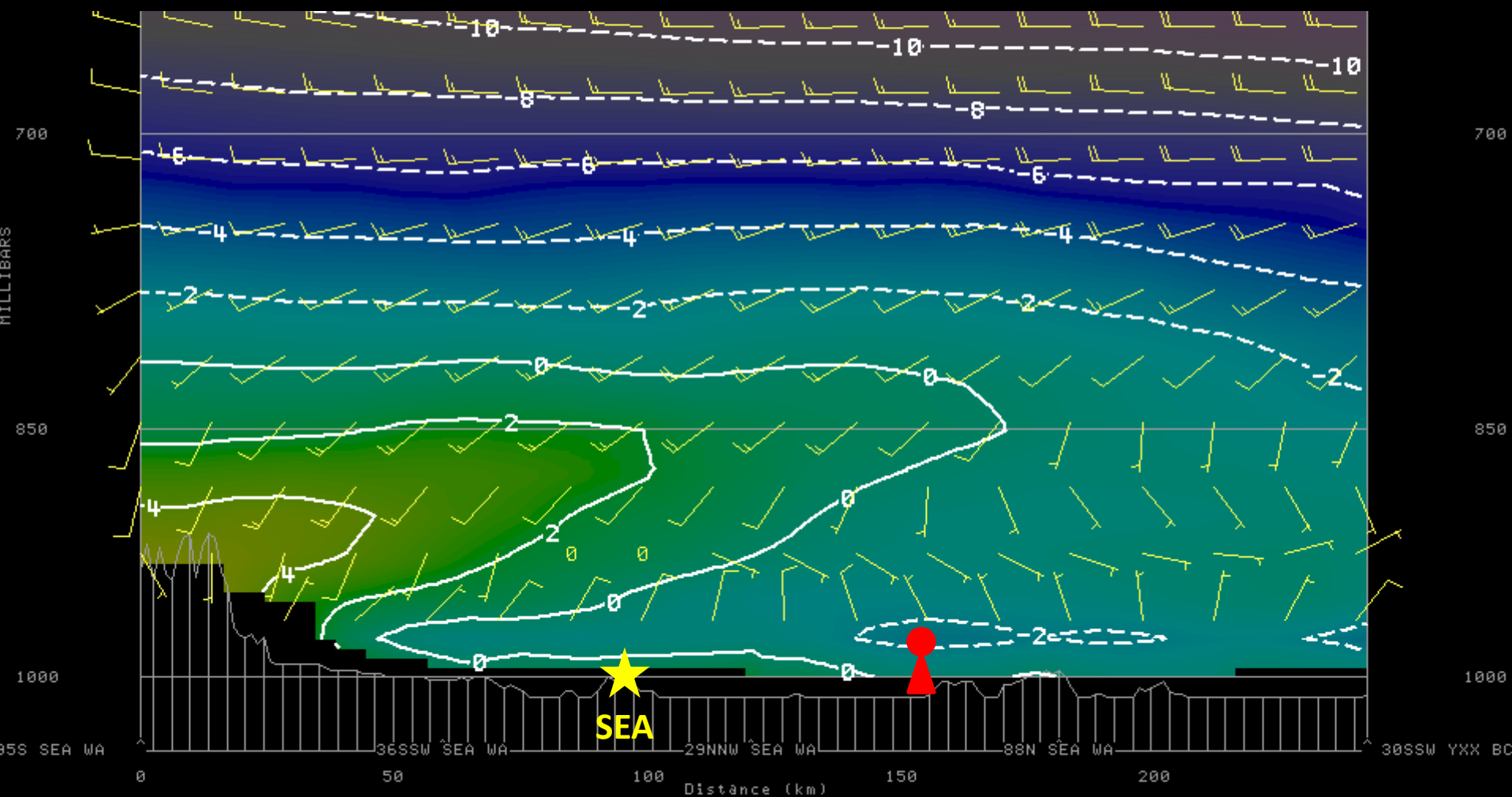
Weather Synopsis



A cold air outbreak from Alaska swept into the Pacific Northwest beginning on Saturday, 14 January and continued through Friday, 20 January, 2012.

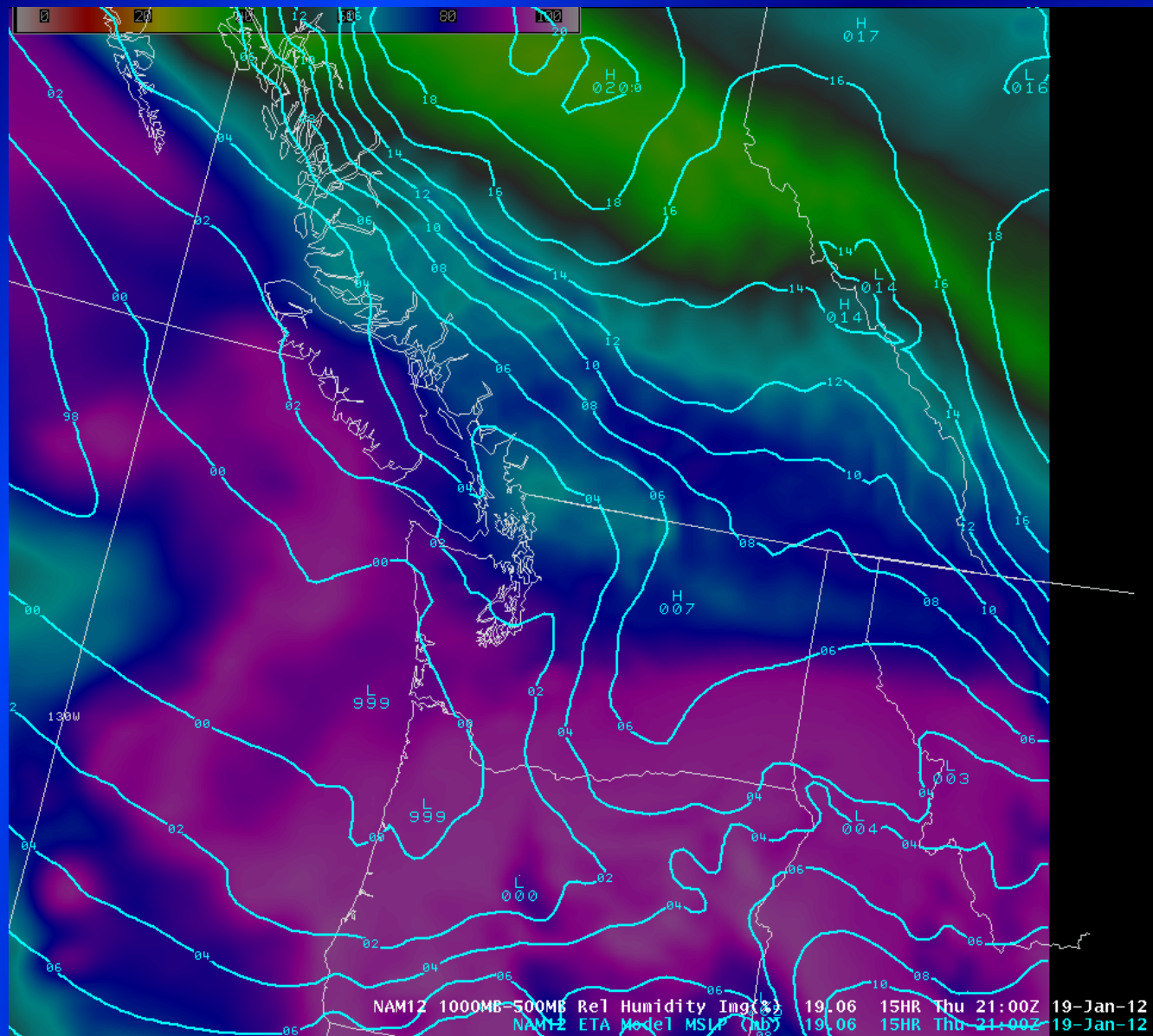
A series of storm systems within the outbreak brought a variety of winter weather to the region throughout the week, culminating in a historic freezing rain event that affected a significant portion of western Washington on Thursday, 19 January, 2012.

Cross-section @ 1 PM



NAM12 lined	Wind (kts)	19.06	15HR	Thu	21:00Z	19-Jan-12
NAM12 lined	Temperature (C)	19.06	15HR	Thu	21:00Z	19-Jan-12
NAM12 lined	Temperature Img(C)	19.06	15HR	Thu	21:00Z	19-Jan-12

Surface Pattern





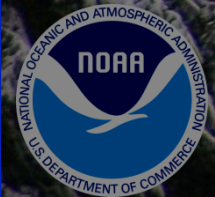
Western Washington Winter Weather

Storm Summary - Preliminary Results

14-23 January, 2012

Snowfall at the Langley Hill Radar

Updated





Synopsis



A cold air outbreak from Alaska swept into the Pacific Northwest beginning on Saturday, 14 January and continued through Friday, 20 January, 2012.

A series of storm systems within the outbreak brought a mix of significant mountain and lowland snow, wind and colder temperatures throughout the week, culminating in a historic freezing rain event that affected a significant portion of western Washington on Thursday, 19 January, 2012.